This equation can be expressed by Green's temperature functions of the complex time t + iβ'. A different method is, however, followed in the following: When use is made of the cyclic property of the spur and the identity:

$$\left[Q, X\right] = iQ\int_0^\beta d\beta' \dot{X}(-i\beta'),$$ for $B = \dot{r}^B = i(\mathcal{H}, r^B)$, where $\mathcal{H}$ is the complete Hamiltonian of the system, Eq. (2.1) is transformed to:

$$\left.\begin{aligned}\sigma_{AB}(\omega) &= -i\int_0^\infty dt \exp(iEt)\langle\langle A(t), r^B(0)\rangle\rangle, \\ [X, Y] &= XY - YX.\end{aligned}\right| \qquad (2.2)$$

In the second quantization and considering that the electron - photon interaction is the principal mechanism of scattering the following holds:

$\mathcal{H} = \mathcal{H}_e + \mathcal{H}_r + \lambda V$; $\mathcal{H}_e = \sum_\alpha \varepsilon_\alpha a_\alpha^+ a_\alpha$; $\mathcal{H}_r = \sum_{\vec{q}} \omega_{\vec{q}} b_{\vec{q}}^+ b_{\vec{q}}$;

$\lambda V = \sum_{\vec{q};\, \alpha\alpha'} L_{\vec{q}}^{\alpha\alpha'} a_\alpha^+ a_{\alpha'} (b_{\vec{q}} - b_{-\vec{q}}^+)$; $L_{\vec{q}}^{\alpha\alpha'} = C_{\vec{q}}(\alpha|\exp(i\vec{q}\vec{r})|\alpha')$. For free

electrons $L_{q}^{\alpha\alpha'} = C_{q}(n|\exp(iq_x x)|n') \prod_{j=y,z} \delta(k_j - k_{j'} + q_j)$. The current operators are $A = \sum_{\alpha\alpha'} A_{\alpha\alpha'} a^{+}_{\alpha} a_{\alpha'}$. From this follows:

$$\left.\begin{aligned} \sigma_{AB}(\omega) &= \sum_{\alpha_1\alpha_2} A_{\alpha_1\alpha_2} \varphi_{\alpha_1\alpha_2}(E), \\ \varphi_{\alpha_1\alpha_2}(E) &= \sum_{\alpha_1'\alpha_2'} \Gamma^{B}_{\alpha_2'\alpha_1'} G_{\alpha_1\alpha_2\alpha_2'\alpha_1'}(E), \end{aligned}\right| \qquad (2.3),$$

where

$$G_{\alpha_1\alpha_2\alpha_2'\alpha_1'}(E) = \langle\langle a^{+}_{\alpha_1} a_{\alpha_2} | a^{+}_{\alpha_2'} a_{\alpha_1'} \rangle\rangle_E = \frac{-i}{2\pi} \int_{-\infty}^{\infty} dt\, e^{iEt} \theta(t) \langle [a^{+}_{\alpha_1}(t) a_{\alpha_2}(t), a^{+}_{\alpha_2'} a_{\alpha_1'}] \rangle \qquad (A);$$

$\theta(t) = \begin{cases} 0 & t < 0 \\ 1 & t > 0 \end{cases}$ is the spectral representation of the lagging Green's temperature function. By the method of such equations the equations for $\varphi^{B}_{\alpha_1\alpha_2}(E)$ are derived in λ^2 approximation. The following is written down:

$$\left(E-\varepsilon_{\alpha_1\alpha_2}\right)G_{\alpha_1\alpha_2\alpha_2'\alpha_1'}(E)=f_{\alpha_1\alpha_2}\delta_{\alpha_1\alpha_1'}\delta_{\alpha_2\alpha_2'}+v^{(m)}_{\alpha_1\alpha_2\alpha_2'\alpha_1'}+ \\ +\sum_{j=1,3}\sum_{q}\left[L_q^{+}G^{(j)}_{\alpha_1\alpha_2+q\,\alpha_2'\alpha_1'}-L_q^{-}G^{(j)}_{\alpha_1-q\,\alpha_2\alpha_2'\alpha_1'}\right], \quad (2.4),$$

where in the λ^2 approximation

$$v_{\alpha_1\alpha_2\alpha_2'\alpha_1'}=\delta_{\alpha_2'\alpha_2}\left\langle a^+_{\alpha_1}a_{\alpha_1'}\right\rangle-\delta_{\alpha_1'\alpha_1}\left\langle a^+_{\alpha_2'}a_{\alpha_2}\right\rangle\simeq \\ \simeq f_{\alpha_1\alpha_2}\delta_{\alpha_1\alpha_1'}\delta_{\alpha_2\alpha_2'}+v^{(m)}_{\alpha_1\alpha_2\alpha_2'\alpha_1'}, \quad (B).$$

Here, $f'_{\alpha_1\alpha_2} = f_{\alpha_1} - f_{\alpha_2}$ (f_α = equilibrium distribution of the electrons). The following holds in Eq. (2.4):

$$G^{(j)}_{\alpha_1\alpha\,\alpha_2'\alpha_1'}=\left\langle a^+_{\alpha_1}a_{\alpha}b^{(j)}_q\middle|a^+_{\alpha_2'}a_{\alpha_1'}\right\rangle, \quad (2.5),$$

where $b_q^{(j=1,3)} = b_q$; $b_q^{(j=2)} = b^+_{-q}$. For nondegenerate electron gas and

Boltzmann distribution for f_{α} large Gibb's ensemble goes over into canonical ensemble in which the following holds: $\langle a^{+}_{\alpha_1} \ldots a^{+}_{\alpha_s} a_{\alpha'_1} \ldots a_{\alpha'_r} Q \rangle = 0$ for $s > 1$, $r > 1$ (2.6). From this condition is obtained:

$$\left(E - \Omega^{qj}_{e e_1}\right) G^{(j)}_{e_1 q e e'_2 e'_1} = C^{(j)}_{e_1 q e e'_2 e'_1} + \sum_{e' q'} \left[L^{e e'}_{q'} \langle a^{+}_{e_1} a_{e'} b^{(j)}_{q} \left(b_{q'} + b^{+}_{-q'}\right) | a^{+}_{e'_2} a_{e'_1} \rangle_{E} - L^{e' e_1}_{q'} \langle a^{+}_{e'} a_{e} \left(b_{q'} + b^{+}_{-q'}\right) b^{(j)}_{q} | a^{+}_{e'_2} a_{e'_1} \rangle_{E} \right], \quad (2.7),$$

where

$$\Omega^{qj}_{e e_1} = \varepsilon_{e} - \varepsilon_{e_1} - (-1)^{j} \omega_{q};$$

$$C^{(j)}_{e_1 q e e'_2 e'_1} = \delta_{e'_2 e} \langle a^{+}_{e_1} a_{e'_1} b^{(j)}_{q} \rangle - \delta_{e'_1 e_1} \langle a^{+}_{e'_2} a_{e} b^{(j)}_{q} \rangle. \quad (C).$$

The following is assumed for the linear electron-photon interaction:

Card 5/13

23103

Derivation of a kinetic ... S/181/61/003/005/008/042
B101/B214

$$\left.\begin{aligned}&\langle a^+_{\alpha_1} a_{\alpha'} b_q^{(j)} \left(b_{q'} + b^+_{-q'}\right) \big| a^+_{\alpha'_2} a_{\alpha'_1} \rangle_E \simeq \\ &\simeq G_{\alpha_1\alpha';\alpha'_2\alpha'_1}(E) \left\langle b_q^{(j)} \left(b_{q'} + b^+_{-q'}\right)\right\rangle \simeq G_{\alpha_1\alpha';\alpha'_2\alpha'_1}(E)\, N_q^{(j)} \delta_{q,-q'}, \\ &N_q^{(j=1,2)} = N_q = \left(e^{\beta\omega_q} - 1\right)^{-1}, \quad N_q^{(j=2)} = 1 + N_q.\end{aligned}\right\} \qquad (2.8).$$

Introduction of (2.8) in (2.7), calculation of $G_{\alpha_1 \vec{q} \alpha;\ \alpha'_2 \alpha'_1}$ and substitution in Eq. (2.4) taking into account (2.3) leads to:

$$(E - \omega_{\alpha_1\alpha_2})\varphi^{\beta}_{\alpha_1\alpha_2}(E) + L\varphi^{\beta}_{\alpha_1\alpha_2}(E) = \Pi^{\beta}_{\alpha_1\alpha_2}(E), \qquad (2.9),$$

where

$$\begin{aligned}L\varphi^{\beta}_{\alpha_1\alpha_2}(E) = \sum_{j=1,2}\sum_q\sum_{\alpha\alpha'} \Big(&\varphi^{\beta}_{\alpha\alpha'} L_q^{\alpha_1\alpha} L_{-q}^{\alpha'\alpha_2} \left[N_q^{(j+1)}\left(E - \Omega^{qj}_{\alpha\alpha_2}\right)^{-1} + \right. \\ &\left. + N_q^{(j)}\left(E - \Omega^{qj}_{\alpha_1\alpha'}\right)^{-1}\right] - \varphi^{\beta}_{\alpha_1\alpha} L_q^{\alpha\alpha'} L_{-q}^{\alpha'\alpha_2} N_q^{(j)}\left(E - \Omega^{qj}_{\alpha_1\alpha'}\right)^{-1} - \\ &- \varphi^{\beta}_{\alpha\alpha_2} L_q^{\alpha_1\alpha'} L_{-q}^{\alpha'\alpha} N_q^{(j+1)}\left(E - \Omega^{qj}_{\alpha'\alpha_2}\right)^{-1}\Big),\end{aligned} \qquad (2.10),$$

Card 6/13

$$\Pi^B_{\alpha_1\alpha_2}(E) = r^j_{\alpha_1\alpha_2}\varphi_{\alpha_1\alpha_2} - \sum_j\sum_q\sum_{\alpha\alpha'}\{r^B_{\alpha_1\alpha}L_q^{\alpha\alpha_1}L_{-q}^{\alpha'\alpha}[f_q^{(j)}(\alpha_1,\alpha')(E-\Omega^{(j)}_{\alpha'\alpha})^{-1} +$$
$$+ f_q^{(j)}(\alpha,\alpha_1)(E-\Omega^{(j)}_{\alpha\alpha_1})^{-1}] - r^B_{\alpha'\alpha}L_q^{\alpha\alpha_1}L_{-q}^{\alpha_1\alpha}f_q^{(j)}(\alpha',\alpha)(E-\Omega^{(j)}_{\alpha'\alpha})^{-1} - \qquad (2.11).$$
$$- r^B_{\alpha\alpha_1}L_q^{\alpha'\alpha}L_{-q}^{\alpha\alpha'}f_q^{(j)}(\alpha,\alpha')(E-\Omega^{(j)}_{\alpha\alpha'})^{-1}\},$$
$$f_q^{(j)}(\alpha,\alpha') = \frac{\exp(\beta\Omega^{(j)}_{\alpha\alpha'})-1}{\Omega^{(j)}_{\alpha\alpha'}}f_\alpha N_q^{(j)},$$
$$f_\alpha = \exp[\beta(\mu-\varepsilon_\alpha)].$$

Here $C^{(j)}_{\alpha_1 q \alpha_1';\ \alpha_2^! \alpha_1^!}$ has been expanded in power series of λ. In strong magnetic field the inhomogeneity of $\Pi^B_{\alpha_1\alpha_2}(E)$ of Eq. (2.9) contains besides $\Pi^{(0)}_{\alpha_1\alpha_2} \sim \lambda^0$ also terms $\lambda^2\Pi^{(2)B}_{\alpha_1\alpha_2}(E)$ since for $\omega - \omega_{\alpha_2\alpha_1} \neq 0$ one has: $\mathrm{Re}\,\sigma^{(e)}_{\lambda\beta} \sim \lambda^2$. For $\varphi^{(0)B}_{(\alpha_1\alpha_2)} \sim \lambda^0$ one obtains:

$$(E-\omega_{\alpha_2\alpha_1})\varphi^B_{(\alpha_1\alpha_2)} + \zeta_{rel}\varphi^B_{(\alpha_1\alpha_2)} = \Pi^B_{(\alpha_1\alpha_2)} \qquad (2.12).$$

23103

where $\tilde{\Pi}^B_{[\alpha_1\alpha_2]} = \Pi^B_{[\alpha_1\alpha_2]} + R^B_{[\alpha_1\alpha_2]}$. 2) For free electron gas with effective mass m the zeroeth approximations for $\varphi^{(0)}_{n\,\bar{n}-1}$, $\varphi^{(0)}_{\bar{n}+2,\bar{n}+1}$ and $\varphi^{(0)}_{\bar{n}'\bar{n}-1}$ are introduced in Eq. (2.9) and equations for $\varphi_n(k,E) = \varphi_{n,k,n+1k}(E)$ are obtained. For the case $\varphi_n(k_z^2,E) = \tilde{\varphi}_n(k_z,E)$ the following holds:

$$[i(\omega-\omega_c)-Q_n(k_z,\omega)]\,\Phi_n(k_z)+\sum_{n'=0}^{\infty}\int\frac{dq_z}{2\pi}Z_{nn'}(k_z,q_z,\omega)\,\Phi_{n'}(k_z+q_z)= \tag{3.1}$$

$$=i\Pi^{(\varphi)}_n(k_z)-\Pi^{-}_n(k_z),$$

where

$$Q_n(k_z,\omega)=\sum_{j=1,2}\sum_{n'=0}^{\infty}\int\frac{(dq)}{(2\pi)^3}\left\{|L_q^{n'n}|^2 N_q^{(j)}\delta(\omega-\omega_{n+1,n'}+(-1)^j\omega_q)+\right.$$

$$\left.+N_q^{(j+1)}|L_q^{n+1,n'}|^2\delta(\omega-\omega_{n'n}+(-1)^j\omega_q)\right\}, \tag{3.2}$$

$$Z_{nn'}(k_z,q_z,\omega)=\sum_{j=1,2}\iint\frac{dq_x\,dq_y}{(2\pi)^2}L_q^{n'n}L_{-q}^{n+1,n'+1}\times$$

$$\times\left[N_q^{(\nu+1)\beta}(\omega-\omega_{s+1s'}+(-1)^{\nu}\omega_q)+N_q^{\nu\beta}(\omega-\omega_{s'+1s}+(-1)^{\nu}\omega_q)\right];$$

$$\Pi''_s(k_s)=\Pi''_{sk_s\,s+1k_s}-\sum_{\nu=1,2}\sum_{s'=0}^{\infty}\int\frac{(dq)}{(2\pi)^3}\left\{L_q^{ss'}L_{-q}^{s+1,s'+1}\varphi^{(0)}_{s',s'-1}\times\right.$$

$$\times\left[N_q^{(\nu+1)\beta}(\omega-\omega_{s's-1}+(-1)^{\nu}\omega_q)+N_q^{\nu\beta}(\omega-\omega_{ss'-1}+(-1)^{\nu}\omega_q)\right]-$$

$$-\varphi^{(0)}_{s,s-1}L_q^{s+1s'}L_{-q}^{s's-1}N_q^{(\nu+1)\beta}(\omega-\omega_{s's}+(-1)^{\nu}\omega_q)-$$

$$\left.-\varphi^{(0)}_{s+1,s+1}L_q^{s's}L_{-q}^{s+1s'}N_q^{\nu\beta}(\omega-\omega_{s+1s'}+(-1)^{\nu}\omega_q)\right\},$$

$$n'\equiv(n',\ k'=k+q),\qquad \Pi''_{sk_s\,s+1k_s}=\lim_{\varepsilon\to+0}\operatorname{Im}\Pi_{sk_s,s+1,k_s}(E),$$

Here the conservation laws have been taken into consideration: $k'=k+\vec{q}$; $k=(k_x,k_y)$; $\vec{q}=(\vec{q}_x,\vec{q}_y)$. In the quantum limit for $\beta\omega_0\gtrsim 1$ Eqs. (3.1) can be solved by the method of successive approximation. For the quantum limit $\beta\omega_0>1$ (3.1) takes the form:

$$[i(\omega-\omega_s)-Q_s(k_s,\omega)]\Phi_s(k_s)+ \tag{3.3}$$

$$+\int\frac{dq_s}{2\pi}Z_s(k_s,q_s,\omega)\Phi_s(k_s+q_s)=-\Pi''_s(k_s)+i\Pi^{(0)}_s(k_s),$$

23103

S/181/61/003/005/008/042
B101/B214

where $Q_0 = Q_{n=0}$; $Z_0 = Z_{n=0,n'=0}$; $\tilde{\Pi}_0^n = \Pi^n_{n=0}$. Hence for the electric conductivity of free electrons one obtains: $\mathrm{Re}\,\sigma_{xx}(\omega) = e^2 \mathrm{Im}\left[g(E) - g(-E)\right]$; $\mathrm{Im}\,\sigma_{xy}^{(a)}(\omega) = e^2 \mathrm{Im}\left[g(E) + g(-E)\right]$; $\mathrm{Re}\,\sigma_{xy}^{(a)}(\omega) = e^2 \mathrm{Re}\left[g(E) + g(-E)\right]$; $\mathrm{Im}\,\sigma_{xx}(\omega) = -e^2 \mathrm{Re}\left[g(E) - g(-E)\right]$; (3.4), where $g(E) = \sum_{n=0}^{\infty} \int_{-\infty}^{\infty} (dk_z/2\pi)\sqrt{n+1}\,\Gamma_{nk_z n+1k_z}(E)(\omega_0/q_0)$ (3.5); and for $\beta\omega_0 \gg 1$: $g(E) \simeq g_0(E) = \int_{-\infty}^{\infty} (dk_z/2\pi\sqrt{2}q_0\omega_0^{-1})\Gamma_{0k_z,1k_z}(E)(\omega_0/q_0)$, $\varepsilon \to +0$. For the case of elastic scattering at acoustic phonons $sq_0 \ll kT$, $Z_0 = 0$ and for $g_0(E)$ one obtains: $\mathrm{Im}\,g_0(E) = +\int_{-\infty}^{\infty} (dk_z/2\pi\sqrt{2}q_0\omega_0^{-1})(\Pi_0^{(0)}(k_z)Q_0(k_z,\omega) + (\omega - \omega_0)\tilde{\Pi}_0^n(k_z))\left[(\omega - \omega_0)^2 + (Q_0(k_z,\omega))^2\right]^{-1}$; $\mathrm{Re}\,g_0(E) = \int_{-\infty}^{\infty} (dk_z/2\pi\sqrt{2}q_0\omega_0^{-1})(\omega - \omega_0)\Pi_0^{(0)}(k_z)\left[(\omega - \omega_0)^2 + (Q_0(k_z,\omega))^2\right]^{-1}$ (3.6). By means of Eqs. (3.4)-(3.6), σ_{xx}, σ_{xy} are

calculated in the case investigated. A) When for real $k_z \lesssim m/\beta$ the following holds: $(\omega - \omega_0)^2 \gg (Q_0(k_z,\omega))^2$, one obtains the iteration equations of Ref. 1. B) For $(\omega - \omega_0)^2 \lesssim (Q_0(k_z,\omega))^2 \sim \lambda^4$ in the neighborhood of resonance $(\omega - \omega_0)\tilde{\Gamma}''_0 \sim \lambda^4$ is neglected and the lines of cyclotron resonance for each k_z are a superposition of the quasi Lorenz lines for whose width the following holds: $Q_0(k_z,\omega) = \sum_{l=0,1} W_l(k_z,\omega)$, where

$$W_l(k_z, \omega) = \frac{\pi C_0^2}{\beta M s^2} \sum_{n=0}^{\infty} \sum_{\pm} \int \frac{(dq)}{(2\pi)^3} |L_q^{nl}|^2 \delta(\omega + \omega_0(n + l - 1) - (-1)^l \Delta \pm sq), \qquad (D).$$

C_0 is the constant of the deformation potential, M the density of the substance, and $\Delta = (k_z^2/2m) - (k_z + q_z)^2/2m$. In the quantum limit investigated the following holds:

Card 11/13

23103

S/181/61/003/005/008/042
B101/B214

$$Q_0(k_z, \omega) \propto \frac{q_0^2 m C_0^2}{\pi\beta M s^2 \sqrt{k_z^2 + 2q_0 ms}} \begin{cases} 1 & \text{при } 0 < \omega < \omega_0, \\ 1 & \text{при } \omega \ll \omega_0, \end{cases} \quad (3.7).$$

$$\text{т. е. } Q_0 \sim \frac{\omega_0}{\beta}(k_z^2 + 2q_0 ms)^{-1/2}.$$

It follows from Eqs. (3.6)-(3.7) that for $\omega = 0$ the logarithmic divergence $\int dk_z/k_z$ of the scattering is removed even without taking into consideration the small inelasticity. If $sq_0 \ll kT$ $Q_0(k_z) \sim |k_z|^{-1}$ is neglected the Born approximation is not valid even for $k_z \to 0$, and σ_{xx} must be calculated from Eqs. (3.4)-(3.7) taking into account the small inelasticity of $sq_0 \leqslant kT$. N. N. Bogolyubov and S. V. Tyablikov are mentioned. There are 15 references: 11 Soviet-bloc and 4 non-Soviet-bloc. The 4 references to English-language publications read as follows: P. Martin, J. Schwinger, Phys. Rev. 115, 1342, 1959; R. Kubo, Phys. Soc. Jap., 12, 570, 1957; E. Adams, T. Holstein, J. Phys. Chem. Sol., 10, 254, 1959; A. Kahn, Phys. Rev., 119, 1960.

Card 12/13

23103
S/181/61/003/005/008/042
B101/B214

Derivation of a kinetic ...

ASSOCIATION: Institut poluprovodnikov AN SSSR Leningrad (Institute of Semiconductors AS USSR, Leningrad)

SUBMITTED: August 22, 1960 (initially), February 4, 1961 (after revision)

Card 13/13

KLINGER, M.I.

Author's correction to his article "Theory of linear irreversible processes in a high magnetic field" ("Fizika tverdogo tela," vol. 3, p. 1342. 1961). Fiz. tver. tela 3 no.8:2577-2508 Ag '61. (MIRA 14:8)
(Irreversible processes)
(Magnetic fields)

30062 S/048/61/025/011/006/031
B108/B138

24.7700 (1144, 1385, 1559)

AUTHOR: Klinger, M. I.

TITLE: Theory of the kinetic phenomena in semiconductors of the NiO type

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Seriya fizicheskaya, v. 25, no. 11, 1961, 1342-1346

TEXT: Electron transfer in semiconductors of the NiO type has a number of peculiar features at high temperatures the most important of which is particularly low mobility U(T). In order to elucidate these, the author develops a general theory of transfer with low mobility. The system considered is a small polaron as a carrier at a lattice site in a transition metal which interacts weakly with the remaining, stationary ions. A. F. Ioffe (Canad. Phys., 34, 1393 (1956)) had originated the idea that carriers jump from one lattice site to the other. This also holds here if the polaron band width $\Delta_{pol} < \hbar\bar{\Gamma}(T)$, where $\bar{\Gamma}(T)$ is the mean width of the unperturbed polaron level, i.e., small polarons and continuous phonon spectrum. The theory is built up on the basis of previous papers

Card 1/3

X

30062

Theory of the kinetic phenomena in... S/048/61/025/011/006/031 B108/B138

(Klinger M. I., Fizika tverdogo tela, 1, 1225 (1959); 2, 309 (1960)) in which the author defined the kinetic coefficients σ_{AB}. In this paper he considers only steady processes for which $\sigma_{AB}^{(s)} = \frac{1}{2}(\tilde{\sigma}_{AB} + \tilde{\sigma}_{BA})$, where

$$\tilde{\sigma}_{AB} = \frac{\beta N_e}{2} \int_{-\infty}^{\infty} dt e^{-\epsilon|t|} \operatorname{Re} \langle BA(t) \rangle, \qquad (2)$$

B and A denote the fluxes of charge, energy, etc. The Hamiltonian of the system under review is $H = H_0 + \lambda_0 H'$ with

$$H_0 |sn^{(s)}) = \varepsilon (n^{(s)}) |sn^{(s)}); \quad (sn^{(s)} | H' | s'n'^{(s')}) = (sn^{(s)} | V_{s'} | s'n'^{(s')});$$
$$(sn^{(s)} | H' | sn^{(s)}) = 0; \quad \lambda_0 V_{s'} = \sum_{r (\neq s')} V_r (x - a_r); \qquad (3)$$

$\langle ... \rangle = \operatorname{Sp} \exp(\beta F - \beta H)(...)$; N_e is the carrier concentration; $\beta = 1/kT$. $n^{(s)}$ is the number of phonons, which may vary in an $s \rightarrow s'$ transition (s, s' are lattice nodes). $(sn^{(s)} | s'n^{(s')}) = \delta_{ss'} \delta_{nn'}$. The term $\lambda_0 H'$ is

Card 2/3

Card 3/3

24.2700

43936
S/030/62/002/008/003/005
I046/I246

AUTHOR: Klinger, M.I.

TITLE: The theory of transport phenomena in low-mobility semiconductors (Derivation of formulas for fundamental kinetic coefficients)

PERIODICAL: physica status solidi, v. 2, no. 8, 1962, 1062-1087

TEXT: This work is a sequel to M.I.Klinger's previous papers (Ref.1: Izv. AN SSSR, physical series, no. 11, 1342, 1961; Ref.2: DAN SSSR, 142, 1065, 1962) where the general theory of transport phenomena in low-mobility semiconductors is developed without reference to any concrete model. It is shown that transport involves multi-phonon transitions of polaron-type carriers between neighboring lattice cells. The general methods of Ref. 2 are used in determining the electric conductivity and thermoelectric and thermomagnetic coefficients. The energy transport due to polarons is found to be negligible. It is also shown that drift involves independent transitions whereas the Hall effect is determined by phase-correlated transitions. All the results are obtained for crystals where the concentration of lattice cells is much higher than

Card 1/2

The theory of transport phenomena...

the concentration of carrier and impurity.

ASSOCIATION: Institut poluprovodnikov Akademii Nauk SSSR Leningrad (The Institute of Semiconductors, Academy of Sciences USSR, Leningrad)

SUBMITTED: May 29, 1962

Card 2/2

S/181/62/004/011/009/049
B102/B104

AUTHOR: Klinger, M. I.

TITLE: Theory of transfer effects in semiconductors with low mobility (the characteristics of the electric spectrum of the system)

PERIODICAL: Fizika tverdogo tela, v. 4, no. 11, 1962, 3075 - 3085

TEXT: A theoretical investigation of the energy spectrum of ordered and disordered semiconductors with low mobility is described, $u \ll |e| a^2 / \hbar$ $cm^2/v.sec$ where $|e| a^2 / \hbar \approx 1$ $cm^2/v.sec$ at $a \approx 3.10^{-8}$ cm, a is the lattice constant or in general the distance of adjacent ions. Starting from a system of interacting phonons and stripped carriers (electrons, holes, or Frenkel' excitons) located in the static field of a semiconductor the general properties are investigated for an unperturbed system and for a system perturbed in its ($\bar{\Phi}n$) base. Any anharmonic phonon characteristic is neglected. A representation of the orthonormalized ($\bar{\Phi}n$) base is obtained for localized carrier functions and for the spectrum. The complete perturbance matrix differs from that given in Phil. Mag. 3, 1361, 1958; J. Phys.

Card 1/4

Chem. Sol. 5, 34, 1958; Ann. of Phys. 8, 343, 1952. The singularities are studied. The general case for n=n' yields

$$(sn|\mathcal{H}'|s'n'=n)=\Big((s|\delta V|s')+\sum_{fj}\big[(X^{s'}_{fj})^{*}N_{fj}-X^{s}_{fj}(1+N_{fj})\big]V^{ss'}_{fj}+$$

$$+\sum_{fj}\big[X^{s}_{fj}N_{fj}-X^{s'}_{fj}(1+N_{fj})\big](V^{s's}_{fj})^{*}\Big)_{s\neq s'}\exp[-\Phi_{ss'}(n)]; \qquad (2.30).$$

For H = 0 gives $(sn|\mathcal{H}'|s'n'=n)=(s'n|\mathcal{H}'|sn)$, and

$$\left.\begin{aligned}(sn|\mathcal{H}'|s'n'=n)&=\delta\overline{V}^{ss'}(n^{(s)}|n^{(s')}),\\ \delta\overline{V}^{ss'}&=(s|\delta V|s'+\sum_{fj}[V^{ss'}_{fj}(X^{s}_{fj})^{*}+(V^{s's}_{fj})^{*}X^{s}_{fj}]\end{aligned}\right\} \qquad (2.31).$$

$V_{fj}^{x}(x)$ is the interaction coefficient of a dressed carrier with phonons with the quasi-momentum $\vec{f}$ of the j-th branch and with a frequency $\omega_{\vec{f}j}$, $N_{\vec{f}j}$ is the number of phonons, δV the potential fluctuation,

$$V^{s}_{fj}\equiv V^{ss}_{fj};\ V^{ss'}_{fj}\equiv(s|V_{fj}(x)e^{ifx}|s'),\qquad X^{s}_{fj}\equiv-V^{s}_{fj}\cdot\omega^{-1}_{fj}\sim N_{o}^{-1/2};$$

The investigation of an unperturbed system and of a perturbation in the |kn) base follows. The interrelation of the system characteristics in the

Card 2/4

$|\hat{s}n)$ and $|\hat{k}n)$ bases is studied. The orthonormalized $|\hat{k}n)$ base of non-localized carrier functions is represented, in taking the translation symmetry of the crystal into account. The expressions obtained for the carrier energy in the bands differ by a pre-exponential factor from those given in the papers mentioned above. The following expressions are derived:

$$\mathcal{E}_n(\mathbf{k}) = \sum_{s'(\neq s)} \delta V(s-s') \cos \mathbf{k}_n (s-s') \exp[-\Phi_{ss'}(n)], \qquad (3,6)$$

$$\Phi_{ss'}(n) = \sum_{fj} \frac{1}{2} |X_{fj}^{ss'}|^2 (1+2N_{fj}), \qquad (3,7)$$

$\mathbf{k}_n = \mathbf{k} - \sum_{fj} \mathbf{f} N_{fj}$ — carrier quasi-momentum

$$(\mathbf{k}n|\mathcal{H}'|\mathbf{k}'n') = \delta_{\mathbf{k}\mathbf{k}'} N_0^{-1} \sum_{s,s'} e^{-i\mathbf{k}(s'-s)} (sn|\mathcal{H}'|s'n')_{s'\neq s}, \qquad (3.16)$$

$$(\mathbf{k}n|\mathcal{H}'|\mathbf{k}'n') \sim \delta_{\mathbf{k}\mathbf{k}'} N_0^{-1/2} |_{\gamma > 1} \text{ при } n \neq n'. \qquad (3.17)$$

$$J^{(l)}_{\mathbf{k}n,\mathbf{k}'n'} = (\mathbf{k}n|\mathcal{H}' f_1(\mathcal{H}_0) \ldots f_{l-1}(\mathcal{H}_0) \mathcal{H}'|\mathbf{k}'n' \sim \begin{cases} \delta_{\mathbf{k}\mathbf{k}'} \delta_{nn'} \\ \delta_{\mathbf{k}\mathbf{k}'} (1-\delta_{nn'}) N^{-1/2} \end{cases} \qquad (3.18)$$

$$
\begin{aligned}
(sn|\mathcal{H}'|s'n') = & \Big\{\delta V^{ss'}(n^{(s)}|n'^{(s')}) + \sum_{ij}\big[V_{ij}^{ss'}(n^{(s)}|C_{ijs}|n'^{(s')}) + \\
& + (V_{ij}^{s's})^{*}(n^{(s)}|C_{ijs}^{+}|n'^{(s')})\big]\Big\}_{s\ne s'} \exp[i(\varkappa_s s - \varkappa_{s'} s')] = \\
= & \Big\{(s|\delta V|s')(n^{(s)}|n'^{(s')}) + \sum_{ij}\Big[V_{ij}^{ss'}\prod_{f\bar{r}}(0|(b_{\bar{r}f})^{\nu_{\bar{r}f}}(T_{\bar{r}f}^{s})^{+} b_{ij} \times \\
& \times T_{\bar{r}f}^{s'}(b_{\bar{r}f}^{+})^{\nu'_{\bar{r}f}}|0) + (V_{ij}^{s's})^{*}\prod_{f\bar{r}}(0|(b_{\bar{r}f})^{\nu_{\bar{r}f}}(T_{\bar{r}f}^{s})^{+} b_{ij}^{+} T_{\bar{r}f}^{s'}(b_{\bar{r}f}^{+})^{\nu'_{\bar{r}f}}|0)\Big]\Big\}_{s\ne s'} \times \\
& \times \exp[i(\varkappa_s s - \varkappa_s s')],
\end{aligned}
\qquad (2.23).
$$

Finally the relation of $|\vec{s}n)$ and $|\vec{k}n)$ functions and expressions for complex term shifts in both bases are examined.

ASSOCIATION: Institut poluprovodnikov AN SSSR, Leningrad (Institute of Semiconductors AS USSR, Leningrad)

SUBMITTED: March 12, 1962 (initially)
June 2, 1962 (after revision)

S/181/62/004/011/010/049
B102/B104

AUTHOR: Klinger, M. I.

TITLE: Theory of transfer effects in semiconductors with low mobility (general approach in the theory of transfer processes and criteria of this theory)

PERIODICAL: Fizika tverdogo tela, v. 4, no. 11, 1962, 3086 - 3103

TEXT: The theory of transfer effects is extended, and its limits determined in continuation of earlier investigations (FTT, 4, 11, 3075, DAN SSSR, 140, no. 5, 1065, 1962; Izv. AN SSSR, ser. fiz. No. 11, 1342, 1961). The object was to arrive at general basic relations enabling any kinetic coefficient to be calculated and also determine the criteria for applicability of this theory. The basic equations for calculating the kinetic coefficients are derived, and for the zeroth approximation the following expression is obtained:

$$\underset{0}{\sigma}^{(0)}_{MN} = \beta \int_0^\infty dt \, \frac{1}{2} \sum_{\alpha\alpha'} e^{\beta F_\alpha - \beta \varepsilon_\alpha} \operatorname{Re} \left(\underset{0}{N}_{\alpha\alpha'} (\alpha'_t | \underset{0}{M} | \alpha_t) + \underset{0}{M}_{\alpha\alpha'} (\alpha'_t | \underset{0}{N} | \alpha_t) \right), \qquad (2,36)$$

where

Card 1/3

$$|\alpha_t) \equiv \exp[-i\varepsilon_\alpha t - \Gamma_\alpha t]|\alpha)$$

$$\Gamma_\alpha = \sum_{\alpha' n'} |(\alpha n|\mathcal{H}'|\alpha' n')|^2 \Gamma_{\alpha_n}(n')[(\varepsilon_\alpha - \varepsilon_{\alpha'})^2 + (\Gamma_{\alpha_n}(n'))^2]^{-1} \qquad (2.37).$$

An example is given showing how to obtain the first and second order correction formulas. The first-order correction is of the following type

$$(\alpha|\underset{\bullet}{N}|\alpha')(\alpha'|\mathcal{H}'|\alpha'')(\alpha''|\underset{\bullet}{N}|\alpha), \qquad (2.40).$$

The limits of application are investigated for semiconductors with a strong electron-phonon coupling ($\Phi_0 \gg 1$) and with a small radius of the polaron-type carriers. The contribution of each approximation to various special cases is estimated. Two appendices deal with problems arising in these approximations. Conclusions: In order to realize the transfer effects it is necessary to have a high enough temperature, i. e. $T > T_0$, where $T_0 \approx \omega_p$ and ω_p is the characteristic phonon frequency. Another necessary condition is $\Delta_e/\Phi_0\omega_p \gg 1$ where Δ_e is the electron band width. It follows from the criteria that at $T > T_0$ a new transfer type will occur, caused by transitions of localized carriers between lattices. Uneven effects with respect to the

Theory of transfer effects in ... S/181/62/004/011/010/049
B102/B104

magnetic field, such as the Hall effect, are determined by the contribution of phase-correlated transitions. In this respect the transfer shows a quantum-type character.

ASSOCIATION: Institut poluprovodnikov AN SSSR, Leningrad (Institute of Semiconductors AS USSR, Leningrad)

SUBMITTED: March 12, 1962 (initially)
June 2, 1962 (after revision)

Card 3/3

34823

14,7700(1035,1043,1055)

S/020/62/142/005/014/022
B104/B102

AUTHOR: Klinger, M. I.

TITLE: Theory of kinetic effects for low carrier mobility

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 142, no. 5, 1962, 1065 - 1068

TEXT: A. F. Ioffe (Canad. J. Phys., 34, no. 12 A, 1393 (1956)) showed the carrier mobility of some semiconductors to be anomalously low. The transport mechanism in these semiconductors was shown to differ largely from the usual one. The author formulates a theory free of limitations and certain difficulties for transport effects in an ideal crystal with small polarons or other small polarizable carriers. Electron-phonon interaction is assumed and an electron (hole) in the field of vibrating ions of a three-dimensional ionic lattice is studied. The total Hamiltonian is given as the sum of the Hamiltonian of the undisturbed system and that of small disturbances. The transport effects are studied in a system with strong electron-phonon coupling. The kinetic

Card 1/3

S/020/62/142/005/014/022
B104/B102

Theory of kinetic...

coefficients are calculated by expressions from preliminary studies (M. I. Klinger, Fiz. Tverd. tela, 11, no. 12, 1342 (1960); E. Kubo, J. Phys. Soc. Japan, 12, no. 1, 570 (1957)). The condition $\eta \equiv \Delta_{mean}/kT \ll 1$, $\xi =$ [illegible] ω_e [illegible] 1, (i. e., η and ξ are the small parameters of the theory) is a criterion of the applicability of the perturbation theory to the calculation of $\mathcal{D}_{AB}$ [Abstracter's note: $\mathcal{D}_{AB}$ not defined]. [illegible]$_{mean} = \Delta_c \exp(-\Phi(T))$, where Δ_c is the carrier band width, ω_e the characteristic frequency phonon. $\eta \ll 1$ means that the migration occurs due to transitions of localized polaron-type wave packets between the cells. This takes place only if the lifetime of a packet in a cell is shorter than its

Card 2/3

leakage time. $\xi \gg 1$ is the condition of quasisteadiness of the state of polarization of the lattice around the carriers. This paper was the subject of a report given at the Soveshchaniye po ferro- i antiferromagnetizmu (Conference on Ferro- and Antiferromagnetism) in Leningrad on May 6, 1961. There are 11 references: 4 Soviet and 9 non-Soviet. The four most recent references to English-language publications read as follows. A. Miller, E. Abrahams, Phys. Rev., 120, no. 3, 745 (1960); C. H. Jonker, J. Phys. Chem. Sol., 9, no. 27, 165 (1959); L. van Houten, Phys. Chem. Sol., 17, no. 1/2, 7 (1960); T. Holstein, Ann. of Phys., no. 3, 343 (1959).

ASSOCIATION: Institut poluprovodnikov Akademii nauk SSSR (Institute of Semiconductors of the Academy of Sciences USSR)

PRESENTED: July 24, 1961, by A. A. Lebedev, Academician

SUBMITTED: June 28, 1961

Card 3/3

4

L 14391-63 EWT(1)/EWG(k)/BDS/EEC(b)-2 AFFTC/ASD/ESD-3 Pz-4
AT/IJP(C)

ACCESSION NR: AP3001728 Q/0030/63/003/005/0805/0823

AUTHOR: Klinger, M. I. 66

TITLE: Hall effect in low mobility semiconductors 21 62

SOURCE: Physica status solidi, v. 3, no. 5, 1963, 805-823

TOPIC TAGS: Hall mobility, electrophonon coupling, transport phenomena, mobility tensor, semiconductor, Hall angle

ABSTRACT: Expressions are derived for the antisymmetric part of the mobility tensor (to a first, linear, order approximation in magnetic field) and for the Hall mobility (Hall angle) for a low mobility semiconductor. The purpose of this and previous works by the author is the developing of a simple variation of the theory of polaron transport of the non-boltzmann type, for which the usual transport theory is not applicable. An estimate is made of the magnitude and dependence of the Hall mobility on temperature and on the electron-phonon coupling constant. Further calculations show that the Hall mobility is usually much larger than the drift (ohmic) mobility.

Card 1/2

L 14391-63

ACCESSION NR: AP3001728

4

"The author expresses deep thanks to Professors M. A. Krivoglas, I. M. Lifshits and S. I. Pekar for their discussions about the problem of the classical limit which were a stimulus to its more detailed analysis; the author likewise acknowledges the assistance of Prof. S. I. Pekar with whom he discussed the contribution of excited states which stimulated more detailed analysis of that problem." Orig. art. has: 52 equations.

ASSOCIATION: Institut poluprovodnikov AN SSSR, Leningrad (Semiconductor Institute of the Academy of Sciences of the SSSR)

SUBMITTED: 05Nov62 DATE ACQ: 10Jun63 ENCL: 00

SUB CODE: GE NO REF SOV: 004 OTHER: 007

Card 2/2

L 12879-63 EWT(1)/EWG(k)/BDS/EEC(b)-2 AFFTC/ASD/ESD-3 Pz-4
AT/IJP(C)
ACCESSION NR: AP3000513 S/0020/63/150/002/0286/0289 63

AUTHOR: Klinger, M. I. 62

TITLE: Theory of low-temperature transfer in semiconductors with low mobility

SOURCE: AN SSSR. Doklady, v. 150, no. 2, 1963, 286-289

TOPIC TAGS: low-temperature transfer, semiconductor, non-Boltzmann transfer, polaron

ABSTRACT: The first part of the article discusses the theory of high temperature transfer in semiconductors of low mobility, i.e. some approximate solution of the problem of a non-Boltzmann transfer in an electrophone system with intense reaction, whose parameter PHI is much greater than 1. The transfer coefficients Sigma sub MN are normally computed by a general formula which is typified by equation (1) of enclosure 1. Corrections for ReD sub MN are discussed in detail. The second part of the article examines the basic correlations of this transfer theory in the same semiconductors, but at low temperatures. In this region of T, using a static case for simplicity, for Sigma sub MN sup (s, a) being identically equal to 1/2 (Sigma sub MN + or - Sigma sub NM), equations (2) and (3) of enclosure 2 are valid. Author then discusses equations for describing carriers (polarons) and presents modifications for equations (2) and (3). Orig. art. has: 23 equations.

Card 1/4

Inst. of Semi-Conductors

ACCESSION NR: AP4042789 S/0020/64/157/003/0566/0569

AUTHOR: Klinger, M. I.

TITLE: Theory of nonstationary conductivity of semiconductors with low mobility

SOURCE: AN SSSR. Doklady*, v. 157, no. 3, 1964, 566-569

TOPIC TAGS: semiconductor carrier, carrier mobility, semiconductor conductivity, polaron, crystal lattice

ABSTRACT: The theory developed by the author elsewhere (Phys. tverd. tela, a) v. 4, 3075, 1962; b) 4, 386, 1962; Phys. Stat. Sol. v. 2, 1062, 1962; DAN v. 142, 1065, 1962; Izv. AN SSSR ser. fiz., no. 11, 1342, 1961) is used to calculate the tensor of nonstationary conductivity $\sigma_{\mu\nu}(\omega)$ and mobility $u_{\mu\nu}(\omega)$ for a semiconductor with low mobility, in which a carrier such as a small polaron is described

Card 1/2

ACCESSION NR: AP4042789

essentially by a local-type function. Approximations are given for the ohmic mobility and for the contributions made to it by the "jumps" of the polaron packet and its "diffusion." It is deduced that the mobility has a noticeable maximum as a function of the frequency. The Faraday angle and the mobility are determined for a magnetic field parallel to the OZ axis in a similar fashion for not too small frequencies, for crystals in which three suitable sites can be mutually nearest neighbors. It is shown that usually the Faraday angle decreases with increasing frequency and with increasing temperature. Orig. art. has: 11 formulas. Report presented by A. A. Lebedev.

ASSOCIATION: Institut poluprovodnikov Akademii nauk SSSR (Institute of Semiconductors, Academy of Sciences SSSR)

SUBMITTED: 07May63

ENCL: 00

SUB CODE: SS

NR REF SOV: 005

OTHER: 005

Card 2/2

L 20580-66

ACC NR: AP6002041 SOURCE CODE: GE/0030/65/012/002/0765/0774

AUTHOR: Klinger, M. I.

55
B

ORG: Institute of Semiconductors of the Academy of Sciences of the USSR, Leningrad

TITLE: Theory of transport phenomenon in low mobility crystals. II. Relaxation and transport of small-radius polarons as a stochastic jumping process

21

SOURCE: Physica status solidi, v. 12, no. 2, 1965, 765-774

TOPIC TAGS: transport phenomenon, semiconductor crystal, crystal property, crystal theory, polaron, stochastic process, mass energy relation, physical diffusion, Boltzmann distribution, Markov process

ABSTRACT: A stochastic theory of high temperature of small polaron transport was developed by generalising on Sewell's model (G. Sewell, Phys. Rev. 129, 597, 1963). Relaxation of local small polarons is discussed, and a quantitative picture of this non-Boltzmann type of transport is given. The transport and relation of such carriers can be considered as a stochastic type of hopping diffusion, but its main equation is non-Markovian (with "memory"). Orig. art. has: 19 formulas. [Based on author's abstract] [NT]

SUB CODE: 20/ SUBM DATE: 22Mar65/ ORIG REF: 002/ OTH REF: 009

Card 1/1 BK

KLINGER, M.I.

Characteristics of the transfer and relaxation of small-radius polarons. Dokl. AN SSSR 165 no.3:520-523 N '65.
(MIRA 18:11)

1. Institut poluprovodnikov AN SSSR. Submitted February 16, 1965.

KLINGER, O., ing.

Strengthening a metallic railroad superstructure with a prestressed tie rod by heating. Rev cailor fer 12 no. 6: 322-326 Je '64.

1. Planning Institute for Transport and Telecommunications.

KLINGER, P.

"Mechanization of Harvesting Coarse Fodder. p. 353 (JARMUVEK ES GEPEK Vol. 1, No. 12, Dec 1954; Budapest, Hungary.)

So: Monthly List of East European Accessions, (EEAL), LC, Vol. 4, No. 4, April 1955, Uncl..

KLINGER, P.

KLINGER, P. Possibilities of mechanising maize production. p. 218

Vol. 8, no. 5, May 1956
AGRATUKOMANY
AGRICULTURE
Budapest, Hungary

So: East Europea n Accession, Vol. 6, No. 3, March 1957

KLINGER V. G.

Category : USSR/Optics - Physical Optics K-5

Abs Jour : Ref Zhur - Fizika, No 2, 1957, No 4999

Author : Vulis, L.A., Klinger, V.G.

Title : Concerning the Problem of the Calculation and Simulation of Radiant Heat Exchange.

Orig Pub : Zh. tekhn. fiziki, 1954, 24, No 11, 2070-2078

Abstract : The equations for the radiant heat exchange between gray bodies, separated by a medium that is transparent to rays, are considered. A computation procedure is proposed, based on the direct connection between the intrinsic and resultant radiation. The possibilities of using a light-ray analogue of the radiation heat exchange are evaluated.

Card : 1/1

KLINGER, V.G.

USSR/Optics - Physical Optics. K-5

Abs Jour : Referat Zhur - Fizika, No 3, 1957, 7785

Author : Klinger, V.G.
Inst :
Title : Experiment with a Light Analogue of Radiant Heat Exchange

Orig Pub : Zh. tekhn. fiziki, 1954, 24, No 11, 2083-2089

Abstract : A discussion of the problem of simulating by means of light the radiant heat exchange in a system of opaque gray bodies, separated by a transparent medium. Each body in the system has equal values of the temperature and of the absorbing ability (A) over the entire surface. The surfaces have only diffused reflection and radiation. The purpose of the work was to determine the flux of the resultant radiation (Q) on the surface (F), connected with the density of radiation by the formula $a = dQ/dF = AE_{inc} - E$, where E is the density of the intrinsic radiation, and E_{inc} is the density of the flux incident on the

Card 1/3

USSR/Optics - Physical Optics. K-5

Abs Jour : Referat Zhur - Fizika, No 3, 1957, 7785

given surface. The surfaces of the model were made illuminated so that the distribution of the temperature on the surface is specified by the corresponding distribution of the luminosity in accordance with the Stefan-Boltzmann law. In this case the outer sphere was non-illuminated. The internal spherical illuminator was made of ground glass. The investigated surfaces had non-selective reflection. The flux densities were measured with selenium photocells. The constancy of the voltage on the tubes, and consequently of the luminosity, was insured by means of rheostats. The first series of experiments was carried out at various values of intrinsic radiation. In the second series of experiments investigation was made of the dependence of the resultant flux on the geometric dimensions and on the optical properties of the surfaces of the model. The values of the resulting fluxes, obtained experimentally, are in good agreement with

Card 2/3

USSR/Optics - Physical Optics. K-5

Abs Jour : Referat Zhur - Fizika, No 3, 1957, 7785

with those calculated by the well-known Christiansen formula.
The discrepancy between the experimental data and the theory amounts to from 2 to 8%.

Card 3/3

KLINGER, V. G.

KLINGER, V.G.--"Investigation of the Radiation Exchange of Energy Using a Light Model." Kazakh State U imeni S. M. Kirov. Physicomathematical Faculty. Alma-Ata, 1955. (Dissertation for the Degree of Candidate of Physicomathematical Sciences).

SO: Knizhnaya Letopis' No. 27, 2 July 1955

KLINGER, V.G.

5(1) PHASE I BOOK EXPLOITATION SOV/2639

Akademiya nauk Kazakhskoy SSR, Alma-Ata.

Issledovaniye fizicheskikh osnov rabochego protsessa topok i pechey (Investigation of the Physical Bases of Operational Processes of Combustion Chambers and Furnaces) Alma-Ata, Izd-vo AN Kazakhskoy SSR, 1957. 349 p. 800 copies printed.

Additional Sponsoring Agency: Alma-Ata. Kazakhskiy gosudarstvennyy universitet im. S.M. Kirova.

Ed. (Title page): L.A. Vulis, Doctor of Technical Sciences, Professor; Ed. (Inside book): B.S. Glazyrina; Tech. Ed.: Z.P. Rorokina.

PURPOSE: This book is intended for a wide circle of scientists and industrial engineers.

COVERAGE: The twenty-nine articles of this collection report on experimental and theoretical investigations of different phenomena which constitute an integral part of the complex operational processes of modern combustion engineering equipment, and also, the entire process applicable to different types of burners and furnaces (cyclone combustion chambers, muffle burners, burners with automatic stokers, etc.). Articles in Part I treat laminar and turbulent jets of liquids and compressible gas. Part II reviews methods of modeling combustion processes (light, hydraulic and electrical), enthalpy, temperature measurements, calorimetry, etc. Part III relates to different problems and theories of fuel combustion and special operational features of combustion and furnace equipment. No personalities are mentioned.

[illegible] The Question of the Flat Boundary of a Gas [illegible] Jet 266

[illegible], S.V., and A.P. [illegible]. The Investigation of Two-Phase Free Jets 275

PART II. METHODS OF INVESTIGATION AND MODELING

Vulis, L.A., and V.G. Klinger. Investigating Radiant Energy Exchange by a Method Employing Light Models 283

Klinger, V.G. Experimental Investigation of Radiant Energy Exchange by an Method Employing Light Models 311

Vulis, L.A. The Use of Hydro Integrators [Hydrodynamic and Hydrostatic Integrators] in the Solution of Some Practical Problems 323

[illegible], V.A., and A.T. Trofimenko. The Investigation of a Temperature Field by the Electrothermal Analogy Method 346

Card 1/7

USSR/Physiology of Plants - Photosynthesis. I.

Abs Jour : Ref Zhur - Biol., No 15, 1958, 67788

Author : Darchiya, Sh.P., Kurmayeva, A.Kh., Klinger, V.G.

Inst : Academy of Sciences KazSSR.

Title : A Comparison of the Spectral Luminosity of Live and Torn-Off Plant Leaves.

Orig Pub : Tr. Sektora astrobotan. AN KazSSR, 1957, 5, 174-186.

Abstract : Photographs were taken of the reflection spectra of leaves of the second stratum of lilac, jasmine, and wild mallow; then the leaves were removed from the plants and photographed immediately. Additional photographs were taken after 5, 10, 20, and 40 minutes, one hour, and two hours. Several series of spectrograms of gypsum and barite screens served as a photometric scale. Standard and ultra-violet spectrographs were used with a glass optic.

Card 1/2

USSR/Physiology of Plants - Photosynthesis. I.

Abs Jour : Ref Zhur - Biol., No 15, 1958, 67788

From a comparison of the course of spectral curves for live and torn-off leaves it was found that in the course of the day there were no important variations in the optical characteristics of the leaf, regardless of when it was torn off the plant. The spectral curves were also compared for sunlight and artificial illumination. On the basis of the data acquired the authors consider that by studying the leaves torn off the plant under artificial illumination, it is possible to determine the complete light balance of the plants, to examine the plants in any weather and regardless of their place of growth, to trace the 24-hour course of photosynthesis by using the curves of spectral luminosity of the plants, and to conduct parallel experiments by the spectro-analysis and physiological methods. -- I.B. Sharovatova.

Card 2/2

24.5200

S/058/61/000/008/020/044
A058/A101

AUTHOR: Dubovik, I. I., Klinger, V. G.

TITLE: The light transfer between mirror and diffusion surfaces

PERIODICAL: Referativnyy zhurnal, Fizika, no. 8, 1961, 176, abstract 8D195 (V sb. "Issled. protsessov perenosa. Vopr. teorii otnositel'nosti", Alma-Ata, 1959, 97-100)

TEXT: On the model of light the author solves the problem of the radiant transfer between two mirror surfaces and between a mirror and diffusion surface.

[Abstracter's note: Complete translation]

√B

Card 1/1

PHASE I BOOK EXPLOITATION SOV/3379

Alma-Ata, Kazakhstan. Universitet.

Issledovaniye protsessov perenosa. Voprosy teorii otnositel'nosti (Study of Transfer Processes. Problems in the Theory of Relativity) Alma-Ata, 1959. 236 p. Errata slip inserted. 1,000 copies printed. (Series: Its Trudy)

Sponsoring Agency: Ministerstvo vysshego obrazovaniya SSSR and Kazakhskiy gosudarstvennyy universitet im. S.M. Kirova.

Editorial Board: V.P. Kashkarov, B.D. Kosov, and N.M. Petrova; Resp. Ed.: L.A. Vulis; Tech. Ed.: L.D. Kashkarov.

PURPOSE: This collection of articles is intended for research physicists and engineers. It can also be used by instructors and students at universities.

COVERAGE: The articles of this collection contain the results of 19 studies in transport problems and the general theory of relativity made from 1956 to 1958 by the staff of the kafedra obshchey fiziki i teoreticheskoy fiziki Kazakhskogo universiteta im. S.M. Kirova (Department of General Physics and Theoretical Physics of the S.M. Kirov Kazakh State University). The articles are arranged in two groups. Group one contains 16 articles concerning the research activity of the teplofizicheskaya laboratoriya pri kafedre obshchey fiziki (Heat Physics Laboratory of the Department of General Physics) in the investigation of transport processes of matter, impulse and energy; group two contains three articles reporting on studies of the Department of Theoretical Physics on problems of the theory of relativity. Article one of the collection is an introduction and reviews the problems of transport processes and gives a fairly detailed bibliography of contributions of members of physics department of Kazakh State University. No personalities are mentioned. References accompany each article.

TABLE OF CONTENTS:

Klinger, I.I., and V.V. Bushin. Simulation of Light Produced by Some [illegible] From a Cylindrical Source 89

Bobrik, I.I., and V.A. Klinger. Light Exchange Between Mirror and Diffuse Surfaces 97

Kosov, N.D. Application of the Normal Thermal Regime Method in the Determination of the Coefficient of Diffusion of Liquids 102

Vyshenskaya, V.F., and N.D. Kosov. Temperature Dependence of the Coefficient of Diffusion of Gases 118

Kosov, N.D. Relation Between Coefficients of Inverse Self-Diffusion 126

Berlina, A.D., and V.P. Kashkarov. Fan-like Laminar Twisted Stream of Gas Under Compression 137

Kashkarov, V.P. Motion of a Viscous Liquid Inside a Cone With a Porous Side Surface 153

Kashkarov, V.P. An Accurate Solution of the Equation of Energy 162

Lukʹyanov, A.T. Contribution to the Investigation of the Thermal Regime of a Heterogeneous Process 167

Tarakhtina, E.D., and S.I. Shcherbakov. Turbulent Mixing in Volume 177

[illegible], N.I., and T.A. Potselyuyko. The Malmgren-Shalaykin Method in Its Application to the Plane Particle Problem 185

II. PROBLEMS OF THE THEORY OF RELATIVITY

Petrova, N.M. Laws of Conservation for a System of Rotating Bodies in the General Theory of Relativity 197

Artikbayev, I.A., and N.M. Petrova. The System of Spherically Symmetrical Bodies in the General Theory of Relativity 209

Mursaliyev, I. Tensors of a Moment of Momentum (Kinetic Moment) and of a Moment of Force in Relativistic Mechanics 229

AVAILABLE: Library of Congress (QC71.A45)

Card 2/3

JA/[illegible]
7-29-61

87758

24.5200 (1191, 1498, 1537) S/096/61/000/002/011/014
E194/E155

AUTHORS: Vulis, L.A., Doctor of Technical Sciences,
Gurvich, A.M., Doctor of Technical Sciences, and
Klinger, V.G., Candidate of Technical Sciences

TITLE: Optical Modelling of Radiant Heat Exchange in Furnaces

PERIODICAL: Teploenergetika, 1961, No.2, pp. 67-71

TEXT: The general theory of similarity requires than an optical model should fulfil the three conditions: geometrical similarity; identity of optical properties of surfaces and media; and similarity in the distribution of radiation sources. A special feature of the optical modelling method developed in the Kazakh University is that it avoids fulfilling the third condition by determining on the model a system of optical-geometrical parameters. When these are known it is possible to calculate the distribution of radiant fluxes with an arbitrary distribution of sources in the system in which only the first two conditions need be observed. Thus the technique of optical modelling is greatly simplified. The object of the present article is to direct attention to this method which is still not sufficiently widely used. Accordingly,

Card 1/6

87758
S/096/61/000/002/011/014
E194/E155

Optical Modelling of Radiant Heat Exchange in Furnaces

the essentials of the method are described and practical results are given. In optical modelling of radiant heat exchange the radiant fluxes are so low that the temperature factor does not enter into the experiment. The method is nevertheless applicable to studies of furnaces where heat fluxes and temperatures are high, because the equations of radiant heat exchange are the same whatever the energy or spectral composition of the radial fluxes. The temperature distribution is determined in the model by the self-radiation distribution both in the volume and on the walls. From this the temperature distribution is calculated on the basis of the Stefan—Boltzmann law if an integral radiation is modelled; or by Wien's formula if the nature of radiation is being studied from separate spectral bands. The present article considers only integral radiation and assumes that the radiating walls and media have the properties of grey diffuse radiating and absorbing bodies. In modelling, the object is sub-divided into a number of surface and volume isothermal zones. The optical properties of the surface zones are characterised by the mean absorption capacity and those

Card 2/6

LH

87758

S/096/61/000/002/011/014
E194/E155

Optical Modelling of Radiant Heat Exchange in Furnaces

of the volumetric zones by the attenuation factor of the medium. Modelling consists in constructing a geometrically similar system of surfaces having optical properties identical with the original and a similar distribution of isothermal zones. The attenuating properties required of the medium are discussed. The method is based on the principle of additivity of radiant fluxes which makes it possible to determine the optical-geometrical parameters of the model. If only one surface zone in the model is radiating, the incident flux on different elements of surface can be measured. These incident fluxes will be both those received by direct but attenuated radiation and those reflected from other surfaces. By successively making one zone luminous after another and measuring the resultant incident fluxes, dimensionless absorption factors may be determined for various elements considered. Then the results are summated to determine the flux density incident on any zone from all the other zones. Simple formulae are derived and it is shown that by tests on a single model and simple calculations it is possible to solve a range of problems. The study of radiant heat

Card 3/6

87758
S/096/61/000/002/011/014
E194/E155

Optical Modelling of Radiant Heat Exchange in Furnaces

exchange in the chamber of a stoker-fired furnace by optical modelling is then considered. A transparent plastic model in the shape of a cube of side 15 cm inside contained thin metal walls painted matt black. In one of the walls there were 64 holes which were used to measure the incident radiation. Various difficulties that arise in making the measurements are described. Experience has shown that they can be largely overcome if a thin layer of translucent celluloid with a matt surface is placed between the inner wall of the model and the outer. As incident radiation may be at any angle, the sensitivity of the pick-up should not depend on the angle of incidence. This condition is largely satisfied by a germanium photodiode operating as a valve. This photodiode has maximum sensitivity in the infrared where the absorbing capacity of ordinary water is fairly great. Accordingly water may be used as the attenuating medium in the model. The problem of modelling self-radiation of the medium filling the volume is overcome by having a single source of radiation, moving it from place to place and summating the results. The particular model described was divided

Card 4/6

87758

S/096/61/000/002/011/014
E194/E155

Optical Modelling of Radiant Heat Exchange in Furnaces

into 64 zones. The radiating element was a cube of transparent plastic, corresponding accurately to the size of the zone. The cube contained a small lamp; it was filled with water and the outside was covered with translucent celluloid. To check the experimental procedure a model was used to study the radiant output of a cylindrical source for which a method of calculation exists. The calculated and experimental results agreed within 5% and the accuracy could easily be increased to 2-3%. The burning layer of fuel was represented by a flat illuminator with uniformly luminous matt surface. The measurements were made and for each unit of sub-division a table of 64 local values of absorption factor was drawn up. There was no need to make 64 such tables; because of the symmetry of the model only 16 were required. The tables were then used to calculate absorption factors from formulae (3) and the distribution of incident fluxes on the walls of the model was determined for the case of a uniformly radiant medium and a fuel layer. Examples of radiant flux distribution of the model were plotted. Attention has recently been drawn to radiation

Card 5/6

87758

S/096/61/000/002/011/014
E194/E155

Optical Modelling of Radiant Heat Exchange in Furnaces

back from the screen tubes. Accordingly the difference between the actual operating conditions of screens and those which are usually assumed was investigated. A study was made of the influence of the degree of blackness of the screen tubes on the heat exchange conditions in furnaces. The method of setting up the model to do this is briefly described and comparative data for tubes with absorption factors of 0.6 and 0.9 shows that alteration of the degree of blackness of the screen tubes has no important influence on the radiant heat exchange in the case considered. Results obtained in tests on the optical model with almost black surface were compared with calculated values for absolutely black tubes and agreement was good. Ways in which the procedure may be further developed are discussed and it is recommended as a useful aid in calculations of heat exchange.

There are 3 figures, 1 table and 11 references: 7 Soviet and 4 English.

ASSOCIATION: Kazakhskiy universitet i TsKTI
(Kazakh University and Central Boiler Turbine Institute)

Card 6/6

S/263/62/000/006/013/015
I008/I208

AUTHORS: Vulis, L.A. and Klinger, V.G.

TITLE: A method of light integration

PERIODICAL: Referativnyy zhurnal, otdel'nyy vypusk. 32. Izmeritel'naya tekhnika, no.6, 1962, 51, abstract 32.6.324. (Tr. Kazakhsk.un-ta, 1960, no.2, 103-108)

TEXT: The possibility of calculating the irradiation of targets, of the radiation of sources if self-absorption is taken into account, and of the radiation barrier, etc., by means of an experimental study of radiation rays on an optical model (the latter serves as a light integrator), is discussed. The simplicity and the sufficient accuracy of the method are illustrated by means of an example, in which the radiation dose received by a disk-like target from a source of particles of the same shape is determined.

[Abstracter's note: Complete translation.]

Card 1/1

KLINGERT, N.V., Eng.

Penstocks

Welded turbine collector. Gidr. stroi. 20 No. 5, 1951.

Monthly List of Russian Accessions, Library of Congress, November 1952. UNCLASSIFIED

KLINGERT, N.V., inzhener.

Calculation of steel pressure-pipelines. Gidr.stroi. 22 no.10:37-39 O '53.
(MLRA 6:10)
(Pipe, Steel)

KLINGERT, Nikolay Vasil'yevich; KHOKHARIN, Anatoliy Kharitonovich; KHAZANOVA, A.Z., inzh., retsenzent

[Steel pipelines and equalizing reservoirs of hydroelectric power stations] Stal'nye truboprovody i uravnitel'nye rezervuary gidroelektricheskikh stantsii. Moskva, Energiia, 1965. 207 p. (MIRA 18:3)

1. Leningradskaya proyektno-konstruktorskaya kontora "Gidrostal'proyekt"

KLINGERT, P.V., inzhener.

New developments in the technology of "automatons." Stan. i instr. 18 no.4:27 Ap '47. (MLRA 7:11)
(Machinery, Automatic)

KLINGHER, D.

4

The action of [illegible] acid on the adrenal glands of albino rats. A histological and histochemical study. C. I. Parhon, I. Bunu, E. Lostun, and D. Klingher. Comun. acad. rep. populare Romine 2, 87-90(1952). Forty-two albino rats received daily doses of 1.5-3 mg. of thymonucleic acid for 5-10 months. An atrophy (I) of 27-34% of the adrenal glands of the males was observed, but no histological or histochem. changes were found. It is assumed that the I depresses the function of the adrenal glands.

[illegible] Merdinger

KLINGHER-WASSERMAN, D.

T

Country : RUMANIA
Category: Human and Animal Physiology. Internal Secretion. Thyroid Gland

Abs Jour: RZhBiol., No 19, 1958, 88953

Author : Nituescu, I.; Wasserman, L.; Klingher-Wasserman, D.; Gavrilita, L.
Inst : Rumanian Academy, Iasi Affiliate
Title : The Protective Action of Vitamin A in Dystrophy of the Thyroid Gland, Caused by Thiourea Derivatives.

Orig Pub: Studii si cercetarii stiint. Acad. RPR Fil. Iasi Med., 1956, 7, No 1, 1-16

Abstract: Methylthiouracil was administered in doses of 5 mg/100 g to rats for a period of 15 days. Typical changes resulted in the thyroid gland and in the hypophysis. These changes were less marked (parti-

Card : 1/2

KLINGHER-WASSERMAN, D.

Effect of nicotinic acid on the evolution of avitaminosis of the rat. I. Nițulescu, L. Wasserman, and D. Klingher Wasserman. *Acad. rep. populare Romîne, Bul. [illegible] med.* 8, No. 1, 49-61 (1956). The effect [illegible] administration of small doses (1.5 mg. [illegible]) nicotinic acid to animals with [illegible] died. Nicotinic acid has a favorable [illegible] months of avitaminosis. It [illegible] the colpokeratosis is reduced. An attenuation [illegible] the different glands is observed. [illegible]

3/

KLINGHOFER, L.

Clinical diagnosis of the Kimmelstiel-Wilson syndrome. Orv. hetil. 93 no. 15:455-456 13 Apr 1952. (CIML 23:3)

1. Doctor. 2. Second Internal Clinic (Director -- Prof. Dr. Gabor Csonicser), Szeged Medical University.

KLINGHOFER, L.; SZUPZ, I.

A case of subacute erythroleukemia. Orv. hetil. 94 no.25:684-686 21 June 1953. (CLML 25:1)

1. Doctors. 2. Second Internal Clinic (Director -- Prof. Dr. Gabor Csonicser), Szeged Medical University.

APPROVED FOR RELEASE: 09/18/2001 CIA-RDP86-00513R000723130008-7"

KLINGHOFER, L.;GABOR, P.

Surgical arteriovenous fistula in the therapy of hypertension. Orv. hetil. 94 no.28:776-777 12 July 1953. (CLML 25:1)

1. Doctors. 2. Second Internal Clinic (Director -- Prof. Dr. Gabor Csonicser) and Institute of Surgical Anatomy and Surgery (Director -- Prof. Dr. Gabor Petri) of Szeged Medical University.

KLINGHOFER, L.; ZSOTER, T.

Carditis in serum sickness. Orv. hetil. 94 no.45:1252-1253 8 Nov 1953.
(CLML 25:5)

1. Doctors. 2. Second Internal Clinic (Director -- Prof. Dr. Gabor Csenicser), Szeged Medical University.

KLINGHOFER, Laszlo, dr.,; DAVID, Andras, dr.

Pathological ballistocardiogram. Magy. belorv. arch. 8 no.6:179-183 Dec 55

1. A Gyori Megyei Korhaz igazgato: Mike Zoltan dr. II. szamu Belosztalyanak (foorvos: Klinghofer Laszlo dr.) kozlemenye.

(BALLISTOCARDIOGRAPHY
in pathol. heart cond. (Hun))

KLINGHOFFER, Laszlo, dr.; SZABO, Rezso, dr.; PINTER, Imre, dr.

Waldenstroem's purpura hyperglobulinaemica. Orv. hetil. 96 no.4: 107-109 23 Jan 55.

1. A Szegedi Orvostudomanyi Egyetem II. sz. Belklinikajanak (igazgato: Csonicser Gabor dr. egyetemi tanar) kozlemenye.
(HEMORRHAGIC DIATHESIS,
thrombopathy)

KLINGHOFER, Laszlo, dr.; DAVID, Andras, dr.

Ballistocardiographic in 50 patients. Orv. hetil. 96 no.8:219-221 20 Feb 55.

1. A Gyori Megyei Korhaz (igazgato: Mike Zoltan dr.) II. sz. Belosztalyanak (foorvos: Klinghofer Laszlo dr.) kozlemenye. (BALLYSTOCARDIOGRAPHY, results in 50 patients)

KLINGHOFER, Laszlo, dr.,; SZABO, Rezso, dr.

Electrocardiographic diagnosis of rheumatic carditis. Orv. hetil. 96 no.29:795-800 17 July 55.

1. A Szegedi Orvostudomanyi Egyetem II. sz. Belklinikajanak (igazgato: Csonka Gabor dr. egyet. tanar) kozlemenye.
(RHEUMATIC HEART DISEASE, diagnosis,
ECG)
(ELECTROCARDIOGRAPHY, in various diseases,
rheum. heart dis.)

KLINGHOFER, L.

EXCERPTA MEDICA Sec.18 Vol.1/4 Cardiovascular Apr 57

933. KLINGHOFER L. and SZABÓ R. 2. Med. Klin., Univ. Szeged; 2. Med. Abt., Komitatskrankenh., Györ. Über die Rolle der Elektrokardiographie in der Diagnostik der ventrikulären Hypertrophie an Hand von 100 eigenen Fällen *The role of ECG in the diagnosis of ventricular hypertrophy demonstrated in 100 personal cases* Z. ges. inn. Med. 1956, 11/15 (702—710) Graphs 6 Tables 3

The ECG signs of hypertrophy are described from a differential-diagnostic point of view. Hypertrophy was more frequently diagnosed from the thoracic lead. Standard and thoracic leads, however, frequently supplemented each other. It is demonstrated that in ventricular hypertrophy the form of the ECG curve is not determined by the anatomical conditions.

Florian - Munich

KLINGHOFER, LASZLO, Dr.; NEMETH ELEMER, Dr.; VILAGI GYULA, dr.; DAVID ANDRAS, Dr.

Ballistocardiography in differentiation of heart complaints of organic and nervous origin. Magy. belorv. arch. 10 no.2-3:41-42 Apr-June 57.

1. A gyori Megyei Korhdaz (igazgato: Mike Zoltan dr.) II. sz. Belosztalyanak (foorvos: Klinghafer Laszlo dr.) kozlemenye.
(BALLISTOCARDIOGRAPHY, in various dis.
heart dis., differ. diag. of organic & nerv. heart dis. (Hun))

KLINGMAN, M.N.; KALINKA, V.D.

Micrometastatic cancers in the spinal cord simulating Duchenne-Aran spinal amyotropia. Zhur. nevr. i psikh. 61 no.11:1630-1635 '61. (MIRA 15:2)

1. Klinika nervnykh bolezney (zav. kafedroy - prof. A.S.Pentsik) Rizhskogo meditsinskogo instituta i 1-ya Rizhskaya gorodskaya klinicheskaya bol'nitsa (glavnyy vrach K.F.Bergman).
(SPINAL CORD—CANCER) (ATROPHY, MUSCULAR)
(BRONCHI—CANCER)

KLINGMAN, M.N.

Phenylin treatment of thrombotic cerebral processes. Sov. med. 25 no.4:119-120 Ap '62. (MIRA 15:6)

1. Iz kliniki nervnykh bolezney (zav. - prof. A.S. Pentsik) Rizhskogo meditsinskogo instituta i nevrologicheskogo otdeleniya Rizhskoy klinicheskoy bol'nitsy No.1 (glavnyy vrach K.F. Bergman).
(THROMBOSIS) (INDANDIONE)

L 25963-66

ACC NR: AP6006421 SOURCE CODE: UR/0317/65/000/011/0060/0061

AUTHOR: Klingner, K. (Engineer, Captain, Member of the National People's army of the GDR)

ORG: None

TITLE: Equipment for military staff vehicles

SOURCE: Tekhnika i vooruzheniye, no. 11, 1965, 60-61

TOPIC TAGS: motor vehicle, military operation, armored vehicle, communication equipment, armed forces logistics

ABSTRACT: The military staff equipment carried on motor vehicles in East Germany is briefly described. The leading operation groups usually use armored vehicles of caterpillar or wheel types. The vehicles are equipped with working desks and radio-communication devices of a short-wave range. Telephones are used at stopovers. The main body of the staff personnel is moved in staff vehicles equipped with desks, map boards, cabinets, chairs, typewriters, duplicating and computing machines. In order to increase the working floor space,

Card 1/2

L 25963-66

ACC NR: AP6006421

the lateral walls of the vehicle are made of a collapsible type which, when let down, increases the floor surface 2.5 times. The arrangement of equipment inside the staff vehicle was schematically shown for two versions of which the first one was designed for field operation while the second one was used for rear services. Orig. art. has: 1 figure.

SUB CODE: 15, 19 / SUBM DATE: None / ORIG REF: 000 / OTH REF: 000

Card 2/2

KLINGO, V. V., Cand Phys-Math Sci -- (diss) "On the problem of the theoretical determination of the superfine structure of atomic terms." Vil'nyus, 1959. 7 pp (Min of Higher Education USSR. Vil'nyus State U im V. Kapsukas). 150 copies (KL, 39-59, 101)

8

UGORETS, I.I.; GLAZUNOV, A.A.; SYROMYATNIKOV, I.A.; KASHUNIN, I.S.; POSTNIKOV, N.A.; RADTSIG, V.A.; UL'YANOV, S.A.; GRUDINSKIY, P.G.; VASIL'YEV, A.A.; KUVSHINSKIY, N.N.; BAPTIDANOV, L.N.; TARASOV, V.I.; KRIKUNCHIK, A.B.; SHAPIRO, A.B.; BIBIKOV, V.V.; DVOSHIN, L.I.; KLINGOF, I.D.; KARPOV, M.M.; USPENSKIY, B.S.; CHALIDZE, I.M.; BLOCH, Ya.A.; SHMOTKIN, I.S.

Iosif IAkovlevich Gumin; obituary. Elek.sta.26 no.12:58 D '55.
(Gumin, Iosif IAkovlevich, 1890-1955) (MIRA 9:4)

KLINGOF, I.D.

AUTHOR: Lebedev, A.N., Cand.Tech.Sci. and Klingof, I.D., Engineer SOV/96-58-7-18/22

TITLE: The characteristics, reserves and consumption of fuels produced in India (Kharakteristika dobyvayemykh v Indii topliv, ikh zapasy i potrebleniye.)

PERIODICAL: Teploenergetika, 1958, Vol 5 No.7. pp. 85-86 (USSR)

ABSTRACT: The article opens with a brief historical survey of coal mining in India. Figures are given for 1956 production. The productivity of labour is very low because mechanisation is slight. The main properties of coals from a number of fields are described, and the leading properties of some are tabulated. The properties of Indian crude oil are given; it is of normal viscosity, low ash but high sulphur content. Prospective increases in coal and oil production are considered. There is 1 figure, 1 table and 4 literature references (1 Soviet and 3 English)

1. Fuels - India 2. Fuels - Properties 3. Fuels - Availability 4. Fuels - Consumption

Card 1/1

SOV/96-59-2-15/18

AUTHORS: Lebedev, A.N., Candidate of Technical Sciences
Klingof, I.D., Engineer

TITLE: Power Engineering in India (Energetika Indii)

PERIODICAL: Teploenergetika, 1959, 6 Nr 2, pp 89-91 (USSR)

ABSTRACT: The article opens with a brief review of power engineering developments in India since 1946; curves of installed capacity and power generated in different years being given in Fig 1. Brief descriptions are then given of the power stations at Bokaro, constructed in 1953 and Trombey. There are 3 figures.

Card 1/1

KLINGOFER, H.

"Professional Libraries as Valuable Assistance in the Improvement of Professional Qualifications", p. 74, (MECHANIK, Vol. 27, No. 2, Feb. 1954, Warszawa, Poland)

SO: Monthly List of East European Accessions, (EEAL), LC, Vol. 4, No. 5, May 1955, Uncl.

KLINI, St. K.

KLINI, St. K.

"Introduction to Metamathematics," Izdat. Inostr. Lit., Moskva, 1957. 526 pp. _ 32.25 R.

KLINIKA, M. (Praha 12, Nad Petruskou 4.)

An improved snare for the extraction of concrements from the ureter.
Rozhl. chir. 37 no.5:332-335 May 58.
(URETERS, dis.
concretions, improved snare for extraction (Cz))

KLIMIKOVA, L.A.; TORBOV, V.I.; GORDEYEV, I.V.

Crystallization of indium phosphide from a gaseous phase. Izv. AN SSSR. Neorg. mat. 1 no.12:2100-2103 D '65. (MIRA 18:12)

1. Institut novykh khimicheskikh problem AN SSSR. Submitted June 29, 1965.

VASIL'YEV, Dmitriy Vasil'yevich, zasl. deyatel' nauki i tekhniki RSFSR; MIKHAYLOV, Vladimir Aleksandrovich; MORNEVSKIY, Boris Ivanovich; VYLKOST, V.D., retsenzent; KUTASIN, B.P., retsenzent; KLININA, Ye.V., red.

[Automation of ship equipment] Avtomatizatsiia sudovykh ustanovok. Pod red. D.V.Vasil'eva. 2. izd. perer. i dop. Leningrad, Sudostroenie, 1965. 607 p. (MIRA 19:1)

KLININ, Ye.V., kand.tekhn.nauk, dots.

Explosions and burns during the testing of high-voltage apparatus. Elektrichestvo no.6:91-92 Je '58. (MIRA 11:6)
(Electric transformers--Testing) (Condensers (Electricity)--Testing)

KLINISKIY, Ye.L.

Use of nitroglycerin in evaluating coronary blood circulation.
Kaz. med. zhur. 41 no.3:23-25 My-Je '60. (MIRA 13:9)

1. Iz 1-y kafedry terapii (zav. - deystv. chlen AMN SSSR, prof. M.S. VOVSI) TSentral'nogo instituta usovershenstvovaniya vrachey.
(NITROGLYCERIN—PHYSIOLOGICAL EFFECT)
(CORONARY VESSELS—DIAGNOSIS)
(ELECTROCARDIOGRAPHY)

SHEVCHENKO, M.A.; KLINIYCHUK, Ye.M.; KAS'YANCHUK, R.S.

Purification of water by removing phenols and petroleum products by ozonization. Ukr.khim.zhur. 30 no.5:527-530 '64.

(MIRA 18:4)

1. Institut obshchey i neorganicheskoy khimii AN UkrSSR.

KLINKE, R.

Effect of ultraviolet rays on the blood sugar level in frogs during hibernation and artificial rewarming. Acta physiol.polon. 11 no.5/6:773-774 '60.

1. Z Zakladu Fizjologii Pomorskiej A.M. w Szczecinie, Kierownik: prof.dr E.Miętkiewski.

(HIBERNATION blood)
(BLOOD SUGAR)
(ULTRAVIOLET RAYS)

KLINKE, Romuald

Effect of ultraviolet rays on the blood sugar level in frogs in hibernation and in various environmental temperatures. Roczn. pom. akad. med. Swierczewski. 7:271-282 '61.

1. Z Zakladu Fizjologii Pomorskiej Akademii Medycznej Kierownik: prof. dr Eugeniusz Miętkiewski.

(ULTRAVIOLET RAYS) (HIBERNATION blood)
(BLOOD SUGAR) (TEMPERATURE)

MIETKIEWSKI, Eugeniusz; KLINKE, Romuald

On the effect of ultraviolet rays on the blood sugar level in rabbits. Acta physiol. Pol. 15 no.5:623-634 S-O '64

1. Z Zakladu Fizjologii Akademii Medycznej w Szczecinie (Kierownik: prof. dr. E. Mietkiewski).

KLINKE, Romuald; KAMYSZEW, Antoni; FAFROWICZ, Biruta

On the effect of streptomycin and dihydrostreptomycin on chronaxy of the rabbit ear labyrinth. Roczn. Pom. akad. med. Swierczewski 10:217-235 '64.

1. Z Zakladu Fizjologii Pomorskiej Akademii Medycznej (Kierownik: prof. dr Eugeniusz Mietkiewski) i z Kliniki Ftyzjatrycznej Pomorskiej Akademii Medycznej (Kierownik: prof. dr Zbigniew Garnuszewski).

inski

KLINKER, L.

KLINKER, L. Meterologic effect on fadings of short duration which occur in ultra short-wave radio transmission. Tr. from the German. p. 212.

Vol. 60, No. 4, July/Aug. 1956
IDOJARAS
SCIENCE
Budapest, Hungary

So: East European Accession, Vol. 6, No. 2, Feb. 1957

KLINKIEWICZ, F.

POLAND/Chemical Technology - Chemical Products and Their Application, Part 4. - Dyeing and Chemical Treatment of Textile Materials. H-33

Abs Jour : Ref Zhur - Khimiya, No 7, 1958, 23558

Author : F. Klinkiewicz.

Inst :

Title : Development of Correct Warp Sizing Method Depending on Warp Kind (Combed, Card) and Wool Fiber Content.

Orig Pub : Przem. wlokienniczy, 1956, 10, No 10, Biul. Inst. Wlokien. 19.

Abstract : A recipe for size preparation for warp with various contents of wool fibers (0, 60 and 100%) was developed. The size consists of potato starch and bone glue with an addition of wax emulsion as softener. The ingredients of the wax emulsion are: synthetic wax, olein, glycerin and ammonium salts. It is recommended also to split the strach.

Card 1/1

APPROVED FOR RELEASE: 09/18/2001 CIA-RDP86-00513R000723130008-7"

KLINKO, M.; OLTVANYI, O.

"The nuclear physics situation in Hungary; Dr. Lajos Janossy and Dr. Sandor Szalay, professors of nuclear physics on the present results and plans."

p. 10 (Ujitok Lapja) Vol. 9, no. 22, Dec. 1957
Budapest, Hungary

SO: Monthly Index of East European Accessions (EEAI) LC. Vol. 7, no. 4, April 1958

, F.

Achievement of the Department of Textile Engineering at Budapest Polytechnic. p. 45

LEKA PROMISHLENOST. Vol. 5, No. 1, 1956

Sofiia, Bulgaria

So. East European Accessions List Vol. 5, No. 9 September, 1956

KLINKO, Mark

One of the most modern photograph laboratories in Europe is at the Hungarian Telegraph Agency. Ujit lap 12 no.4:12-13 25 F '60.

UDOVITSKIY, S.; SHEMETS, A.; LILOV, A. (Chernovtsy); KLINKOV, I. (Serpukhov Moskovskoy obl.); TERTYCHNYY, F. (Makeyevka Donetskoy obl.); BOROD'KO, I. (Vorkuta, Komi ASSR); BAZUKIN, P. (Novokuznetsk, Kemerovskoy obl.)

From the editor's mail. Sov. profsoiuzy 20 no.2:32-33 Ja'64. (MIRA 17:2)

1. Zaveduyushchiy yuridicheskim sektorom Ukrainskogo respublikanskogo soveta professional'nykh soyuzov, Kiyev (for Udovitskiy). 2. Konsul'tant yuridicheskogo sektora Ukrainskogo respublikanskogo soveta professional'nykh soyuzov, Kiyev (for Shemets). 3. Neshtatnyy korrespondent zhurnala "Sovetskiye profsoyuzy" (for Brorod'ko).

L 52621-65 EWT(1)/EWP(e)/EWT(m)/EWP(1)/T/EWP(t)/EEC(b)-2/EWP(b)/EWA(h)/EWA(c) Pz-6/Peb/Pi-4 IJP(c) JD/GG/AT

ACCESSION NR: AP5014075 UR/0363/65/001/004/0478/0479

AUTHOR: Grinberg, Ya. Kh.; Medvedeva, Z. S.; Klinkova, L. A. 53

TITLE: Preparation of boron phosphide single crystals 52

B

SOURCE: AN SSSR. Izvestiya. Neorganicheskiye materialy, v. 1, no. 4, 1965, 478-479

TOPIC TAGS: compound semiconductor, boron phosphide, high purity boron phosphide, synthesis, single crystal growth, chemical transport reaction, physical property

ABSTRACT: Synthesis of high-purity (99.998%) microcrystalline boron phosphide powder and a technique of growing boron phosphide single crystals have been developed to produce crystals of the purity and size suitable for measurement of physical characteristics. Difficulties encountered in preparation of this refractory compound semiconductor were emphasized. The purity achieved by the process described was almost an order of magnitude higher than in previous preparations. A chemical transport reaction with iodine vapors was used for growing the single crystals. The reaction involving a diffusion mechanism produced 1—1.5-mm large crystals. Morphology of the crystals was described and x-ray crystallographic data were given. Microhardness of the crystals was measured and found to be somewhat different than

L 52621-65
ACCESSION NR: AP5014075

previously reported. The average thermoelectric power in the 20—150C range was about 150 μv/degree. All crystals displayed n-type conductivity. Orig. art. has: 1 figure. [JK]

ASSOCIATION: Institut obshchey i neorganicheskoy khimii im. N. S. Kurnakova Akademii nauk SSSR (Institute of General and Inorganic Chemistry, Academy of Sciences SSSR)

SUBMITTED: 18Jan65 ENCL: 00 SUB CODE: SS, GC

NO REF SOV: 007 OTHER: 009 ATD PRESS: 4010

Card 2/2

L 10256-66 EWT(m)/T/EWP(t)/EWP(b)/EWA(c) IJP(c) JD

ACC NR: AP6001226 SOURCE CODE: UR/0363/65/001/012/2100/2101

AUTHOR: Klinkova, L. A.; Torbov, V. I.; Gordeyev, I. V.

ORG: Institute of New Chemical Problems, Academy of Sciences SSSR (Institut novykh khimicheskikh problem Akademii nauk SSSR)

TITLE: Crystallization of indium phosphide from the vapor phase

SOURCE: AN SSSR. Izvestiya. Neorganicheskiye materialy, v. 1, no. 12, 1965, 2100-2101

TOPIC TAGS: indium phosphide, crystal growing, chemical transport reaction, single crystal, crystallization

ABSTRACT: A preliminary study has been made of the effect of chemical transport reaction conditions on the preparation of InP single crystals from the vapor phase. The experiments were conducted in sealed evacuated (up to 6×10^{-6} mm Hg at 20C) quartz ampoules using polycrystalline cubic InSb (a = 5.869 Å) as the starting material. The transport temperatures were: in the heterogeneous reaction zone, 950C; in the crystallization zone, 900C. The transporting agents were I or, for a faster reaction, InI. Depending on the transporting agent, concentration, and ampoule diameter the following InP crystals were prepared: 1) n-type crystals of cubic modification up to 2 mm; 2) dendrites up to 3 mm; or 3) polyhedral crystals up to 2 mm. The prerequisites for controlled growing of InP single crystals are an elucidation of the mechanism of the reaction mixture transport to the crystallization zone, and the

 UDC: 546.682'181.1:548.19

L 10256-66

ACC NR: AP6001226

relation between the transport process and crystal growth. Orig. art. has: 1 figure. [BO]

SUB CODE: 20/ SUBM DATE: 29Jun65/ ORIG REF: 001/ OTH REF: 011/ ATD PRESS: 4168

Card 2/2